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ABSTRACT

Management systems, defined as the approaches developed to help administrators make decisions by improving their capacity to identify and evaluate alternatives, are discussed. The discussion covers the need for and principles behind management systems, and the role of the National Center for Higher Education Management Systems (NCHEMS). (MSE)

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WHAT TRUSTEES SHOULD KNOW ABOUT MANAGEMENT SYSTEMS

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Melvin D. Orwig

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND THE ERIC SYSTEM CONTRACTORS."

Presented to:

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When I began to organize my thoughts for today's presentation, it occurred to me that the first thing a trustee might want to know about management systems is: What are they? And I was surprised to discover that I had no ready definition at hand, though several possibilities seemed reasonable. I asked several colleagues to define management system and found that there was little agreement among us. It seemed impossible to provide a definition that did not include the words management or system. The word that most frequently crept in was information. Management system, therefore, was frequently used as a shorthand way of saying management-information system. Another common theme in our talk about management systems involved quantitative approaches to management and the use of economic models in decisionmaking. But my colleagues had not really answered my question: What is a management system?

I was in a predicament, like that of the census taker working in the back hills of Tennessee. He happened on an old log cabin, set back from the road and with the look about it of not having been visited for some time. Nonetheless, he knocked on the door, and an old woman answered. The census taker asked whether she would be willing to answer some questions. Being naturally wary of any man wearing a suit and tie, she wanted to know what the questions would be about. Well, the census taker explained that every 10 years, the U.S. government attempts to find out how many people there are in the country, what their occupations are, how old they are, how much education they have, and so forth. And that, he said, is called taking the census. "Well," replied the old woman, "I'm afraid you've come to the wrong place. I don't know the answer to any of those questions."

Given the wide disparity in professional opinions about what constitutes management systems, I began to wonder if perhaps you, too, might not find yourselves in the wrong place today. For our purposes, however, I will define management system in a relatively narrow sense. I apply the term to approaches developed to assist administrators in making decisions by improving their capacity to identify alternatives and also to understand the differences between those alternatives and their possible consequences.

For the most part, I will focus on quantitative approaches to management. But this is not to suggest that quantitative approaches are the sum of management or management systems. Nor do I want to suggest, as is frequently done, that management systems, or quantitative approaches to management, are ways to eliminate politics from management and decisionmaking. Indeed, a systematic approach to management must use not only the scientific and quantitative dimensions of management, but also the humanistic, artistic, and political dimensions. One advocate of analytical approaches to decisionmaking, Charles Schultze (1968), former Director of the Bureau of the Budget in the Johnson administration, has made this clear. Schultze observes:

> Most of the important budgetary decisions the federal government is called upon to make are not just technical decisions. How budgetary issues are decided affects the cherished values and interests of individuals and groups. In a democracy, the political tools of decisionmaking--bargaining, advocacy, negotiation, and compromise--are the means by which workable arrangements are made amid conflicts about values and interests. [P. vii]

This is true, I would argue, at all levels of government and in most aspects of management. Politics (with a small p) cannot and should not be removed from decisionmaking. It is through the political process that human values are interjected into decisions, and it is in its political aspects that management is most clearly an art.

Aaron Wildavsky (1964), a strident critic of analytical approaches to budgeting, such as Zero-based Budgeting or Program Planning and Budgeting Systems, points out that "in the most general definition, budgeting is concerned with the translation of financial resources into human purposes" (p. 1). Wildavsky observes further:

> Budgeting deals with the purposes of men. How can they be moved to cooperate? How can their conflicts be resolved? How can they find ways of dealing effectively with recalcitrant problems? Serving diverse purposes, a budget can be many things. A political act, a plan of work, a prediction, a source of enlightenment, a means of obfuscation, a mechanism of control, an escape from restrictions, a means to action, a brake on progress, even a prayer that the powers that be will deal gently with the best aspirations of fallible men. [P. xviii]

I might add that Wildavsky's comments on budgeting can be applied equally to management systems or to quantitative approaches to management, both of which serve human purposes and are heirs to all the complexities of human psychology. Paul Diesing (1962) is even more ardent in defending the role of politics in the decision process: "Political rationality is the fundamental kind of reason because it deals with the preservation and improvement of decision structures, and decision structures are the source of all decisions" (p. 231). Diesing also observes:

> The political problem is always basic and prior to the others. This means that any suggested course of action must be evaluated first by its effects on the political structure. A course of action which corrects economic or social deficiencies but increases political difficulties must be rejected, while an action which contributes to political improvement is desirable even if it is not entirely sound from an economic and social standpoint. [P. 228]

Let us concede, then, that management systems will not replace the political and social dimensions of decisionmaking.

Next we may ask: What is the role of management systems? What do they contribute? To answer this question, I turn again to an observation by Charles Schultze. He is concerned with the role of analysis, but for our purposes we can regard the term management systems as synonymous with analysis. "Analysis," Schultze (1968) writes, "can help focus debate upon matters about which judgments are necessary. It can suggest superior alternatives, eliminating, or at least minimizing, the number of inferior solutions. Thus by sharpening the debate, systematic analysis can enormously improve it" (p. 75).

For example, one can place great value on increasing access to higher education and be prepared to support alternative proposals to improve access. But without some basis for credibly assessing the likely impacts or outcomes of different approaches and estimating their costs, one cannot participate effectively in political decisions. Without some understanding of alternative impacts and costs, administrators are hard pressed to know how best to promote access. Moreover, they have no way to judge whether the available resources might be more productively committed to some other valued objective, such as higher levels of student achievement.

Without such comparative and analytical information, the decisionmaker in higher education will often need the rhetorical gifts that Winston Churchill observed in statesmen. "A statesman," Churchill said, "is one who can predict what is to happen--and explain afterwards why it didn't." Or, as Adlai Stevenson once said in a similarly ironic vein: "Upon these conclusions I have based my facts." In most situations, of course, we would prefer to base our conclusions on the facts and to be accurate in our predictions. It is normally preferred to shape the future rather than having to explain away the present. And that, some argue, is more reliably done by weighing and choosing among alternatives. As E. W. Quade (1975) has stated: "If the alternatives are all good, the decision

will be a good one--perhaps not the best, but still good. If some of the alternatives are poor, the issue may still be in doubt" (p. 123). Analysis, then, can help to raise the level of debate. It can refine the options from which we choose and, therefore, help improve the quality of decisions.

The need for and role of analysis is described by Schultze (1968) when he complains--and I suspect that many of us would share his observation--as follows:

> The most frustrating aspect of public life is not the inability to convince others of the merits of a cherished project or policy. Rather it is the endless hours spent on policy discussions in which relevant issues have not been separated from the irrelevant, in which ascertainable facts and relationships have not been investigated but are the subject of heated debate in which consideration of alternatives is impossible because only one proposal has been developed, and, above all, discussions in which nobility of aim is presumed to determine effectiveness of program.
>
> There are enough real value conflicts, institutional rigidities, and scarcities of information in the way of effective government action. Let us not add a massive additional obstacle by assuming that complex values can be effectively translated into necessarily complex programs by nothing more than spirited debate.
>
> It may, indeed, be necessary to guard against the naivete of the systems analyst who ignores <u>political</u> constraints and believes that efficiency alone produces virtue. But it is equally necessary to guard against the naivete of the decisionmaker who ignores <u>resource</u> constraints and believes that virtue alone produces efficiency. [Pp. 75-76]

To sum up, the role of management systems is to support analytical approaches to decisionmaking, with the aim of informing, facilitating, and improving the quality of those decisions. Although quantitatively based, management systems do not deny subjective dimensions. Though analytical in design, they do not ignore the importance of value judgments and the negotiation and compromise that characterize a political environment.

A management system, then, might be viewed as an intervention system, if we think of a decision as a deliberate effort to intervene in a course of events to achieve an end. Management systems help us compare the relative efficacy of the various forms that intervention might take. We are, after all, constantly engaged in trying to satisfy both our short-range and long-range desires as they relate to ourselves and those about whom we care. Ambrose Bierce defined reasoning as the process of weighing probabilities in the scale of desire. That tendency is all too human, and it is precisely that tendency that management systems can help us control. Management systems, in their best sense, are designed to help us step outside ourselves to look at the collective results or possible consequences of decisions taken in pursuit of our desires.

Management systems also provide processes and procedures that allow us to maintain insight into our own behavior as we confront daily decisions. And these systems can also help us to view, assess, and interpret the ways in which our daily activities and decisions are possibly affecting our future potential. At their most refined and effective level, management systems can also identify possible intervention alternatives that may cause us to act differently today--either individually or as an organization--so that our future potential is enhanced.

With this concept of management systems as context, then, I would like to explain the research activities, objectives, and background of the National Center for Higher Education Management Systems (NCHEMS). NCHEMS began as a

cooperative effort among a number of large universities and state agencies in the West. Members of the Western Interstate Commission for Higher Education (WICHE) were concerned in their individual states about costly duplication of effort in higher education. They concluded that an interstate effort to develop compatible exchange data on higher-education costs and outcome analysis was both feasible and necessary. From 1966 through 1977, NCHEMS operated, under various names, as a division of WICHE. In July 1977, NCHEMS became an independent, nonprofit corporation with national status. Its mission now, as during the first 11 years of its existence, is to carry out research, development, and dissemination activities that help improve planning and management in postsecondary education.

Since its designation as a national center in 1971, NCHEMS has been funded primarily by the U. S. Office of Education and the National Institute of Education. The Center also receives substantial support from other federal agencies and from private foundations. NCHEMS is among the research and development organizations made eligible by federal law to receive long-term funding from the National Institute of Education.

Research and development work at NCHEMS does not seek to improve curricula, or instructional techniques, or other factors that influence the outcomes of postsecondary education. The Center has made this choice and has developed its staff and supporting resources accordingly, because the demands for improved planning and management in postsecondary education have been increasing in recent years and are likely to remain high.

When NCHEMS began, higher education was expected to continue indefinitely as a growing enterprise. Consequently, much of the Center's early work was predicated on continued growth. But demographic conditions soon changed. And it became obvious that planning and financing approaches suited to growth were different in many respects from those required for a steady state or for a period of decline. As I shall discuss in a moment, much of the work at NCHEMS

remains useful, whether the environment is that of growth or decline. It has been necessary, however, to recast some of our early thinking and conceptualizations, to reflect the new environment facing higher education.

Let me give you an example of these changes. When the work of NCHEMS was initiated, socially mandated programs were recognized as management problems in higher education. But they were of relatively little significance. Today the management problems associated with affirmative action, the Privacy Act, and the need to accommodate the handicapped all significantly impact planning, financing, and academic productivity. So will impending changes in law concerning retirement age and social security.

All of these influences create new problems and challenges for the management of postsecondary education. Similarly, the changing character and needs of students seeking higher education pose difficult, significant planning and management problems. All these problems, in turn, constitute important challenges for research and development activities at NCHEMS.

Permit me, if you will, to take you back a decade or so to the time when NCHEMS began as an organization. I don't need to tell you that it was a time different from today. Higher education was growing. The growth steadily generated funds to support new programs. The future looked bright indeed. But even in those more optimistic days, many executive officers in institutions and state-level agencies felt a need to develop better management practices. Continued rapid growth, coupled with signs that resources might be tightening in the future, concentrated interest on improving management capability to plan for and finance higher education.

Several premises, therefore, were identified to justify the establishment of an organization like NCHEMS:

1. Relatively little was known about effective planning for higher education. Manufacturers, service industries, and public agencies all appeared to understand much better how to plan for their enterprises than did higher education.

2. There was some understanding of the sources of financial support for higher education. But little was known about the expectations associated with the various sources of funds, and little was known about how to balance the expectations of different funders. Procedures were lacking for relating the sources of funds to their uses and thus being able to explain effectively to funders how their dollars would be used, the benefits that might accrue, and the cost of achieving some particular output, such as cost per student, or cost per degree.
3. There were no effective procedures for projecting the demand for higher-education services or the cost of fulfilling that demand. Our understanding of what constituted efficiency and effectiveness--that is, productivity--in higher education was inadequate. A more complete understanding of productivity seemed critical to the development of procedures for improving planning and financing of higher education.

4. A research and development center like NCHEMS was needed, because information processing and analysis capabilities were obsolete. Institutions and agencies in higher education had little computer capability for processing information and virtually no data, no information, no procedures to support comparative analysis.

Initially, the impulse was to attack all of these problems simultaneously. A more orderly approach was decided on, however, because it appeared that some of the problems could be ameliorated only if other problems were tackled first. Thus the three initial focuses of NCHEMS concentrated on improving the information capability of higher education, developing procedures to identify the costs associated with operating programs, and identifying the outcomes of higher education. Initially, primary emphasis was placed on improving information capability. The aim was to develop a communication base for management. The

concept of a communication base addressed the need for the development of a standard language with which to describe the multitude of activities occurring in higher education. To accomplish this objective, it was necessary to establish definitions of data relating to all aspects of postsecondary education and to develop procedures for translating single data elements into information relevant to policy questions. Neither was a simple task.

Consider for a moment, from a data and informational standpoint, what is meant when we refer to a student in higher education. Perhaps that sounds simplistic. Obviously, anyone who enrolls in a course at an institution could sensibly be defined and identified as a student. From a planning and management perspective, however, the definitional problem is not so easily resolved. A student who enrolls in one course is not equivalent, for funding and budgetary purposes, to a full-time student pursuing a degree. This elemental distinction has increasing importance today, because there are increasing numbers of part-time students. They demand many of the services required by the full-time student, such as registration expenses, spaces in the library, counseling services, parking spaces, and so on. In other respects, however, their impact is quite different from that of full-time students. For planning and management purposes, therefore, it is important to recognize and accommodate these distinctions in information procedures.

And within those student categories, there are important differences. Is a student who enrolls for a regular full-time load of 15 credits equivalent, from a planning and management perspective, to a full-time student who enrolls for 20 credits? Is a student who enrolls in noncredit courses the same as a student who enrolls in courses for credit leading to a degree? Is a student auditing a course the same as a student who is taking the course for credit? I could name several other such distinctions. When aggregated and compiled for

planning and management policies all are relevant to the development of planning and management policies in colleges and universities. And so the development of standard procedures and definitions for the various aspects of what we may call "studenthood" in higher education was a necessary first step in providing a standard language--a communication base--for planning and management.

The problem of establishing these standards was exacerbated by the fact that all institutions were already using definitions of some sort. So if the communication base was to be accepted and used by institutions, consensus on standard definitions had to be achieved. Our efforts to establish a standard language for management in higher education inevitably took us into all aspects of postsecondary education. Definitions and information procedures have been developed for students, facilities, faculty, staff, and finances. They have been applied in the development of cost information and in the identification of outcomes of higher education.

In terms of both costs and outcomes, the information procedures that NCHEMS first developed were relevant. The total institutional cost of a specific course in English, for example, may vary as a function of the number of students who are full-time, part-time, or auditing the course, and the number taking the course as a degree requirement or simply out of interest in that particular course. Similarly, the costs of a program or major in English are affected by the number of students taking courses in all the other disciplines. The English major who has a minor in biochemistry, for example, is likely to impose greater costs on the institution than an English major who has a minor in history. Thus the costs of an English program at one institution are affected by at least two factors: the core-curriculum requirements and the individual interests pursued by English majors. All of these factors must be reflected in procedures for identifying cost information.

It is easy to observe, therefore, that the development of cost information by program major is complex within any institution. When one wishes to compare costs by program across institutions, the procedural dimensions become even more complex. For example, science and engineering courses tend to be more capital intensive than most and have lower student-to-faculty ratios. Therefore, it might be expected that the English major at M.I.T. would have a higher program cost than an English major at an institution where technological curricula are not emphasized. The development of procedures for identifying costs in higher education must accommodate these kinds of differences. As a consequence, these procedures are complex, particularly when one wishes to compare institutions.

Procedures for identifying outcomes are similarly complex. The goals of adult, part-time students may be considerably different from the goals of traditional college-age students enrolled in a full-degree curriculum. Thus procedures for measuring outcomes for an individual student, or of a particular program, must accommodate both the differences in individual expectations and the differential outcomes that may accrue from a specific instructional program.

Significant progress has been made at NCHEMS toward our communication-base objectives. Data-element dictionaries have been developed and updated for a large proportion of the major information categories applying to higher education. Many of the most urgently needed data structures have been developed and are in widespread use, particularly by the National Center for Education Statistics. And because of this progress, NCHEMS now, nearly a decade after its inception, is approaching the point where it can devote major attention to the problem area that it was originally established to address: planning and financing. Over the next five years, planning and financing will emerge as the largest single thrust of NCHEMS research and development activity. We will concentrate on analyzing the applicability of various planning approaches to higher education, developing new strategies for financing, and particularly, to linking the planning and budgeting processes more clearly.

Having developed an infrastructure for management systems, we are now engaged in a variety of activities that are more easily recognizable as relating to those interventionist functions of management systems that I spoke of earlier. The early efforts at NCHEMS to develop cost information focused on procedures for identifying average costs. And historically, financial planning and management decisions in postsecondary education had relied on average-cost information and analysis, when any analysis was used at all. In a period of growth, this approach worked quite well. The average unit cost of a student attending an institution, for instance, almost always exceeded the marginal cost of adding one new student, and thus financial pressures did not occur. In fact, this increment, between the average unit cost and the marginal unit cost, enabled many institutions to expand into new program areas or to enrich existing programs. When enrollments declined, however, this economic phenomenon worked in reverse. It caused institutions to forgo revenue at a much faster rate than their costs could be reduced.

It became apparent that analysis of problems related to declining enrollment would be enhanced if financial planners in postsecondary education could apply concepts related to fixed and variable costs. Moreover, this technique would provide a basis for resource-allocation procedures that is closer to reality.

We know that as enrollments decline in a program or institution, some costs decrease. But we know also that some of the costs of operating a program or an institution are fixed. However, current resource-allocation procedures that utilize average costs do not adequately reflect these meaningful differences in cost behavior. We are in the predicament of the statistician who was drowned in a stream that had an average depth of three feet.

There is an urgent need to achieve a better understanding of cost behavior in higher education and to move beyond the technology of average costing. A major proportion of our resources at NCHEMS, therefore, is now being devoted to

the study of the relationships between costs, enrollment, and revenues. As we are better able to understand these phenomena, we will be able to provide specific procedures to institutions and state agencies, enabling them to establish resource-allocation procedures more responsive to their problems.

At NCHEMS we are also trying to consider other aspects of the current environment for postsecondary educacion. State legislatures are concerned that unnecessary duplication of programs may exist. Pressures increase to coordinate the many sectors of postsecondary education within a state. And as institutions become increasingly motivated to identify their strengths and capacities to deliver needed educational services, they are more concerned with identifying and articulating their mission, role, and scope as a possible planning tool. Thus NCHEMS has embarked upon an effort to identify processes by which institutions can identify and describe their missions, the roles they might play in serving those missions, and the scope of activities through which they will serve those missions. Beyond that, we are studying the coordinative responsibilities of state agencies. Through this development of mission, role, and scope procedures, we hope that state agencies and institutions will be able to work more effectively and cooperatively to meet the challenges presented by changing demographics and increased competition for public funds.

Higher education, in general, may be entering a steady state characterized by stabilizing or declining enrollments. But the milieu of any specific institution of higher education is far from being static. The characteristics, demands, and interests of student clientele at almost all institutions are changing rapidly. The dynamic environment requires of management an ability to achieve institutional change. And to manage institutional change requires a planning process that determines and identifies priorities in a manner that allows them to be translated into shifts in resource allocation.

NCHEMS has developed a handbook for academic and program planning. It is designed to assist institutions in the design, development, and implementation of planning processes that will do several needful things. One is to help the institution assess its readiness for implementing institutional change. Another is to identify guidelines and principles of planning that can be adapted to the institution's unique situation. Our new handbook also identifies ways in which the information requirements of such a planning process can be developed and discusses issues related to the establishment of an effective institutional planning process. In developing this handbook, we have recognized the importance of involving all systems of the academic community in the institutional planning process and the importance of establishing processes and procedures by which institutional change can be achieved.

There is widespread interest at all levels of postsecondary education in the problems faced by colleges and universities in adapting to an environment of little or no growth. There is increasing concern about the potential impacts of such an environment upon the financial health of postsecondary education generally. Decisionmakers, particularly trustees of institutions, need information that will allow them to monitor and understand financial change as it occurs within the enterprise.

Outside the educational arena, similar needs are being met by indicator statistics. Common examples include the use of such indicators as the gross national product, the unemployment rate, the inflation rate, the cost-of-living index, the assessment of alternative economic policies.

We are trying to identify equally reliable and understandable indicators of the financial condition of institutions of higher education. With such indicators, it would be increasingly possible for trustees and executive management to assess the financial status of their institutions and to observe how and when it is changing.

Now, more than ever, NCHEMS needs to be accurate in our assessments of management problems so that we can use our research and development resources most expeditiously. So we are devoting more effort to identifying the needs of executive management and to the development of appropriate research and development strategies.

I am pleased to have had the opportunity to share with you this overview of NCHEMS. I will welcome, in the remaining moments of our session, the opportunity to hear from you what kinds of research and development efforts would be responsive to the problems that you observe in the execution of your responsibilities.

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